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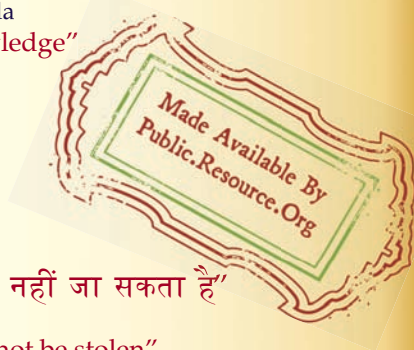
IS 3347-3-2 (1982): Dimensions for Porcelain Transformer bushings for Use in Lightly Polluted Atmospheres - Part III : 17.5 kV Bushings, Section 2: Metal Parts [ETD 6: Electrical Insulators and Accessories]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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IS : 3347 (Part III/Sec 2) - 1982
(Reaffirmed 1994)

Indian Standard

REAFFIRMED

APR 2004

DIMENSIONS FOR
PORCELAIN TRANSFORMER BUSHINGS FOR
USE IN NORMAL AND LIGHTLY POLLUTED
ATMOSPHERES

PART III 12 AND 17.5 kV BUSHINGS

Section 2 Metal Parts

(First Revision)

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 8

May 1983

Indian Standard

DIMENSIONS FOR PORCELAIN TRANSFORMER BUSHINGS FOR USE IN NORMAL AND LIGHTLY POLLUTED ATMOSPHERES

PART III 12 AND 17.5 kV BUSHINGS

Section 2 Metal Parts

(First Revision)

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IS : 3347 (Part III/Sec 2) - 1982

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Indian Standard

DIMENSIONS FOR PORCELAIN TRANSFORMER BUSHINGS FOR USE IN NORMAL AND LIGHTLY POLLUTED ATMOSPHERES

PART III 12 AND 17·5 kV BUSHINGS

Section 2 Metal Parts

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 28 April 1982, after the draft finalized by the Electrical Insulators and Accessories Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard was originally issued in 1967. It is presently being revised in order to align itself with the latest trends in insulator technology. The advent of higher voltages, and the need for insulation to function, more reliably, has necessitated choice of materials, and design of insulators more stringent. The development of new materials, and their successful adoption, thus leading to conservation of scarce material have forced the manufacturers to use indigenous raw material in view of the resulting economy.

0.3 Section 1 of this standard covers the dimensions of porcelain parts of the transformer bushings of 12 and 17·5 kV. This Section 2 lays down the dimensions of the metal parts and accessories of the bushings. No separate dimensions have been specified for 12 kV bushings. It is recommended to use 17·5 kV bushings for 12 kV class.

0.4 The need for changeover to aluminium for the metal parts of bushings has been fully recognized. This section, therefore, includes complete sets of dimensions of parts using aluminium as well as copper. Dimensions of copper parts have been given to ensure a smooth changeover to aluminium.

0.5 In this revision, materials to be used in the manufacture of various accessories have been given with corresponding Indian Standard Specifications.

IS : 3347 (Part III/Sec 2) - 1982

0.6 This standard has been prepared in different parts to cover the dimensions of bushings of various voltage classes. Other parts of this standard are:

Part I Up to and including 1 kV Bushings

Section 1 Porcelain parts

Section 2 Metal parts

Part II 3.6 kV Bushings

Section 1 Porcelain parts

Section 2 Metal parts

Part IV 24 kV Bushings

Section 1 Porcelain parts

Section 2 Metal parts

Part V 36 kV Bushings

Section 1 Porcelain parts

Section 2 Metal parts

Part VI 72.5 kV Bushings

Section 1 Porcelain parts

Section 2 Metal parts (*under preparation*)

Part VII 123 kV Bushings

Section 1 Porcelain parts

Section 2 Metal parts (*under preparation*)

0.7 The dimensions of porcelain transformer bushings for use in heavily polluted atmospheres are covered by the series of IS : 8603*. The metal parts covered by this section may be used for bushings covered by IS : 8603*.

0.8 In the preparation of this standard, assistance has been derived from the following DIN standards issued by Deutscher Normenausschuss:

DIN 42531-1968 Indoor and outdoor transformer bushings, insulation class 10 to 30 kV, 250 A

DIN 42532-1969 Indoor and outdoor transformer bushings, insulation class 10 to 30 kV, 630 A

DIN 42533-1969 Indoor and outdoor transformer bushings, insulation class 10 to 30 kV, 1 000 to 3 150 A.

0.9 In this section, the dimensions of metal parts have been formulated in such a way that the porcelain parts available in Section 1 of this standard may be used both for aluminium as well as copper metal parts. Suitable

*Dimensions for porcelain transformer bushings for use in heavily polluted atmospheres.

references are given to indicate the appropriate porcelain parts at each place.

0.10 For a current rating of 3 150 A no aluminium metal parts have been specified. In such a case the use of two parallel bushings to give the required current carrying capacity is recommended.

0.11 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part III/Sec 2) lays down the dimensions and materials of metal parts and accessories of bushings of 17.5 kV used with transformers for use in normal and lightly polluted atmospheres.

2. MATERIALS

2.1 The material of the various parts shall conform to the relevant Indian Standards specified below:

<i>Metal Part or Accessory</i>	<i>For Bushing with Copper Stem</i>	<i>For Bushing with Aluminium Stem</i>
Hexagonal nut (for stem)	Brass to 2.2 of IS : 1364-1967† and IS : 3138-1966‡ with a minimum tensile strength of 300 N/mm ²	Aluminium alloy to 2.2 of IS : 1364-1967† and IS : 3138-1966‡ with the following properties: <ul style="list-style-type: none"> a) Electrical conductivity at 20°C, <i>Min</i> 43 percent IACS (25 Siemens m/mm²) b) Tensile strength, <i>Min</i> 300 N/mm² c) Brinell hardness 5/250, <i>Min</i> 100 HB

*Rules for rounding off numerical values (*revised*).

†Specification for precision and semi-precision hexagon bolts, screws, nuts and lock nuts (diameter range 6 to 39 mm) (*first revision*).

‡Specification for hexagonal bolts and nuts (M 42 to M 150).

IS : 3347 (Part III/Sec 2) - 1982

<i>Metal Part or Accessory</i>	<i>For Bushing with Copper Stem</i>	<i>For Bushing with Aluminium Stem</i>
Stem (see Fig. 1, 2 & 3)	For 250 A rated bushing brass to Grade 3 of IS : 292-1961* or IS 319-1974† or IS 3488-1966‡ For 630, 1 000, 2 000 and 3 150 A rated bushings, high conductivity copper ETP grade of IS : 191-1967§ and properties to IS : 613-1964	Aluminium alloy having the following properties: a) Electrical conductivity at 20°C, <i>Min</i> 43 percent IACS (25 Siemens m/mm²) o) Tensile strength, <i>Min</i> 300 N/mm² c) Brinell hardness 5/250, <i>Min</i> 100 HB
Cap (see Fig. 4, 5 and 6)	Brass to Grade 3 of IS : 292-1961* or IS : 3488-1966‡	Aluminium alloy to 4 600 M designation of IS : 617-1975¶ or any other suitable aluminium alloy
Upper and lower spark-gap horn (see Fig. 7, 8, 9 and 10)	Cold drawn bright steel bar to IS : 7271-1974**	Cold drawn bright steel bar to IS : 7271-1974**
Spark-gap horn carrier (see Fig. 11)	Brass to Grade 3 of IS : 292-1961* or IS : 3488-1966‡	Aluminium alloy to 4 600 M designation of IS : 617-1975¶ or any other suitable aluminium alloy
Sealing washer for stem (see Fig. 12, 13 and 14)	Oil resistant nitrile rubber made from vulcanized butadiene/acrylonitrile rubber compound having a hardness of 65 to 70 IRHD	Oil resistant nitrile rubber made from vulcanized butadiene/acrylonitrile rubber compound having hardness of 65 to 70 IRHD

*Specification for brass ingots and castings (revised).

†Specification for free-cutting brass bars, rods and sections (*third revision*).

‡Specification for brass bars, rods and sections suitable for forging.

§Specification for copper (*second revision*).

||Specification for copper rods for electrical purposes (*revised*).

¶Specification for aluminium and aluminium alloy ingots and castings for general engineering purposes (*second revision*).

**Specification for bright bars (ordinary/commercial quality).

IS : 3347 (Part III/Sec 2) - 1982

<i>Metal Part or Accessory</i>	<i>For Bushing with Copper Stem</i>	<i>For Bushing with Aluminium Stem</i>
Separator (<i>see</i> Fig. 15, 16 and 17) and general purpose sealing washer Type M (<i>see</i> Fig. 22)	Asbestos fibre jointing to Grade B/O of IS : 2712-1971*	Asbestos fibre jointing to Grade B/O of IS : 2712-1971*
Vent plug (<i>see</i> Fig. 18 and 19)	For 630 A rated bushing, slotted cheese head brass screw AM 8 × 15 of IS : 1366-1968† For 1 000, 2 000 and 3 150 A rated bushing, slotted cheese head brass screw AM 6 × 15 of IS : 1366-1968†	Slotted cheese head aluminium screw AM 6 × 15 of IS : 1366-1968†
General purpose sealing washer (<i>see</i> Fig. 20 and 21) and sealing washer Type N (<i>see</i> Fig. 22)	Nitrile rubber or nitrile rubber bonded cork conforming to Type C Grade RC-70C of IS : 4253 (Part II)-1968‡	Nitrile rubber or nitrile rubber bonded cork conforming to Type C Grade RC-70C of IS : 4253 (Part II)-1968‡
Connecting lug (<i>see</i> Fig. 23)	For 1 000 and 2 000 A rated bushings brass to Grade 2 of IS : 292-1961§ or IS : 3488-1966 For 3 150 A rated bushing, copper chromium alloy forging having the following characteristics: a) Electrical conductivity at 20°C, <i>Min</i> 81 percent IACS (47 Siemens m/mm ²)	Aluminium alloy having the following properties: a) Electrical conductivity at 20°C, <i>Min</i> 43 percent IACS (25 Siemens m/mm ²) b) Tensile strength, <i>Min</i> 300 N/mm ² c) Brinell hardness 5/250, <i>Min</i> 100 HB

*Specification for compressed Asbestos fibre jointing (*first revision*).

†Specification for slotted cheese head screws (dia range 1·6 to 20 mm) (*first revision*).

‡Specification for cork composition sheets; Part II Cork and rubber.

§Specification for brass ingots and castings (*revised*).

||Specification for brass bars, rods and sections suitable for forging.

IS : 3347 (Part III/Sec 2) - 1982

<i>Metal Part or Accessory</i>	<i>For Bushing with Copper Stem</i>	<i>For Bushing with Aluminium Stem</i>
	<p>b) Tensile strength, <i>Min</i> 370 N/mm²</p> <p>c) Brinell hardness 5/250, <i>Min</i> 125 HB</p> <p>d) Chemical composition: chromium 0.3 to 1.2 percent, total impuri- ties 0.3 percent and the remainder copper</p>	
Collar (see Fig. 24)	Brass to Grade 3 of IS:292-1961* or IS:3488- 1966†	Aluminium alloy to 4 600 M designation of IS : 617- 1975‡ any other suitable aluminium alloy
Gasket ring (see Fig. 25)	PTFE or Polyamide	PTFE or Polyamide
Retaining ring (see Fig. 26)	Annealed copper wire	Annealed aluminium wire
U-link ring (see Fig. 27)	Phosphor bronze Grade 3 HE to IS : 7814-1975§	Phosphor bronze Grade 3 HE to IS : 7814-1975§
T-bracket (see Fig. 28)	Steel to Grade Fe 410-S (St 42-S) of IS : 226- 1975	Steel to Grade Fe 310-S (St 42-S) of IS : 226- 1975

NOTE— Where synthetic transformer liquid is used, the material for all sealing washers except Type M of Fig. 22 shall be silicone rubber or any other resilient material compatible with the synthetic liquid.

*Specification for brass ingots and castings (revised).

†Specification for brass bars, rods and sections suitable for forging.

‡Specification for aluminium and aluminium alloy ingots and castings, for general engineering purposes (second revision).

§Specification for phosphor bronze sheet, strip and foil.

||Specification for structural steel (standard quality) (fifth revision).

3. TOLERANCES

3.1 Unless otherwise specified, allowable tolerance on dimensions of any machined metal part shall be in accordance with medium class of IS : 2102-1969*.

3.2 Unless otherwise specified, allowable tolerance on dimensions of any forged or cast metal part shall be in accordance with the coarse class of IS : 2102-1969*.

4. SURFACE FINISH

4.1 The surface finish for ferrous parts shall be hot dip galvanising according to IS : 4759-1968† or zinc plating according to IS : 1573-1970‡ or cadmium plating with chromate passivation Cd 8 Cr according to IS : 1572-1968§ subject to agreement between the manufacturer and the purchaser.

4.2 The surface finish for non-ferrous parts shall be electroplating according to IS : 1359-1977|| subject to agreement between the manufacturer and the purchaser.

5. METAL PARTS AND ACCESSORIES

5.1 Hexagonal Nuts — The hexagonal nuts used shall conform to IS : 1364-1967¶ and IS : 3138-1966**. The threads shall be in accordance with IS : 1362-1962†† and IS : 4218 (Part V)-1979‡‡.

5.2 The dimensions of the metal parts and accessories for bushings with copper and aluminium stems corresponding to the various current ratings shall be in accordance with Table 1.

*Specification for allowable deviations for dimensions without specified tolerances (*first revision*).

†Specification for hot-dip zinc coatings on structural steel and other allied products.

‡Specification for electroplated coatings of zinc on iron and steel (*first revision*).

§Specification for electroplated coatings of cadmium on iron and steel (*first revision*).

||Specification for electroplated coatings on tin (*second revision*).

¶Specification for precision and semi-precision hexagon bolts, screws, nuts and lock nuts (diameter range 6 to 39 mm) (*first revision*).

**Specification for hexagonal bolts and nuts (M 42 to M 150).

††Dimensions for screw threads for general purposes (diameter range 1.6 to 39 mm) (*revised*).

‡‡Specification for ISO metric screw threads: Part V Tolerances (*revised*).

TABLE 1 DIMENSIONS OF METAL PARTS

(Clause 5.2)

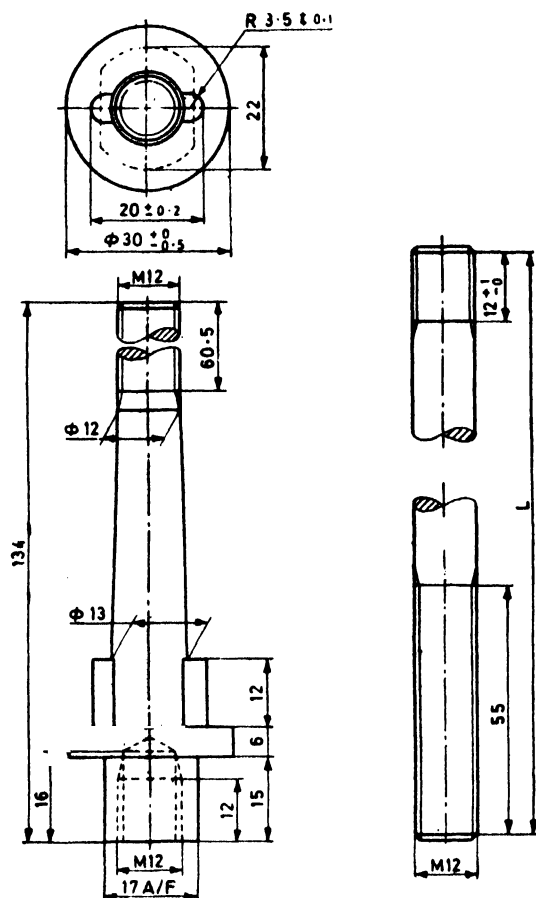
PART/ACCESSORY	METAL OF STEM	CURRENT RATING, A				
		250	630	1 000	2 000	3 150
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Stem	Aluminium	Fig. 1	Fig. 3	Fig. 3	Fig. 3	—
	Copper	Fig. 1	Fig. 2	Fig. 3	Fig. 3	Fig. 3
Cap	Aluminium	Fig. 4	Fig. 6	Fig. 6	Fig. 6	—
	Copper	Fig. 4	Fig. 5	Fig. 6	Fig. 6	Fig. 6
Upper spark-gap horn	Aluminium	Fig. 7	Fig. 9	Fig. 9	Fig. 9	—
	Copper	Fig. 7	Fig. 8	Fig. 9	Fig. 9	Fig. 9
Lower spark-gap horn	Aluminium	—	Fig. 10	Fig. 10	Fig. 10	—
	Copper	—	—	Fig. 10	Fig. 10	Fig. 10
Spark-gap horn carrier	Aluminium	—	Fig. 11	Fig. 11	Fig. 11	—
	Copper	—	—	Fig. 11	Fig. 11	Fig. 11
Sealing washer for stem	Aluminium	Fig. 12	Fig. 14	Fig. 14	Fig. 14	—
	Copper	Fig. 12	Fig. 13	Fig. 14	Fig. 14	Fig. 14
Separator	Aluminium	Fig. 15	Fig. 17	Fig. 17	Fig. 17	—
	Copper	Fig. 15	Fig. 16	Fig. 17	Fig. 17	Fig. 17
Vent plug	Aluminium	Fig. 18	Fig. 19	Fig. 19	Fig. 19	—
	Copper	—	Fig. 18	Fig. 19	Fig. 19	Fig. 19
Sealing washer for general purposes	Aluminium	Fig. 20	Fig. 22	Fig. 22	Fig. 22	—
	Copper	Fig. 20	Fig. 21	Fig. 22	Fig. 22	Fig. 22
Connecting lug	Aluminium	—	Fig. 23 A	Fig. 23 B	Fig. 23 B	—
	Copper	—	—	Fig. 23 A	Fig. 23 B	Fig. 23 B
Collar	Aluminium	—	Fig. 24	Fig. 24	Fig. 24	—
	Copper	—	—	Fig. 24	Fig. 24	Fig. 24
Gasket ring	Aluminium	—	Fig. 25 B	Fig. 25 B	Fig. 25 B	—
	Copper	—	Fig. 25 A	Fig. 25 B	Fig. 25 B	Fig. 25 B
Retaining ring	Aluminium	—	Fig. 26	Fig. 26	Fig. 26	—
	Copper	—	—	Fig. 26	Fig. 26	Fig. 26
U-Link ring	Aluminium	—	Fig. 27	Fig. 27	Fig. 27	—
	Copper	—	—	Fig. 27	Fig. 27	Fig. 27
T-Bracket	Aluminium	—	Fig. 28	Fig. 28	Fig. 28	—
	Copper	—	—	Fig. 28	Fig. 28	Fig. 28

6. ASSEMBLY

6.1 For 17.5 kV/250 A Rating— The assembly of the bushing is shown in Fig. 29.

6.2 For 17.5 kV/630 A Rating— The assembly of bushing is shown in Fig. 30.

6.3 For 17.5 kV/630, 1 000, 2 000 and 3 150 A Rating— The assembly of the bushing is shown in Fig. 31.



Dimension L shall be adjusted so that the overall length 371 in Fig. 29 is obtained.

NOTE 1 — The corresponding porcelain part for this stem shall be 17.5 kV/250 A specified in Part III/Sec 1 of this standard.

NOTE 2 — Internal connections to the stem may also be made by means of flexible cable instead of using bolt. In such a case in place of threaded hole of M12, a suitable hole required for the flexible cable may be made.

NOTE 3 — Head and bolt may be made in one piece.

NOTE 4 — The threaded ends shall be chamfered in accordance with IS : 1368-1967*. The thread run outs and undercuts shall be in accordance with IS : 1369-1975†.

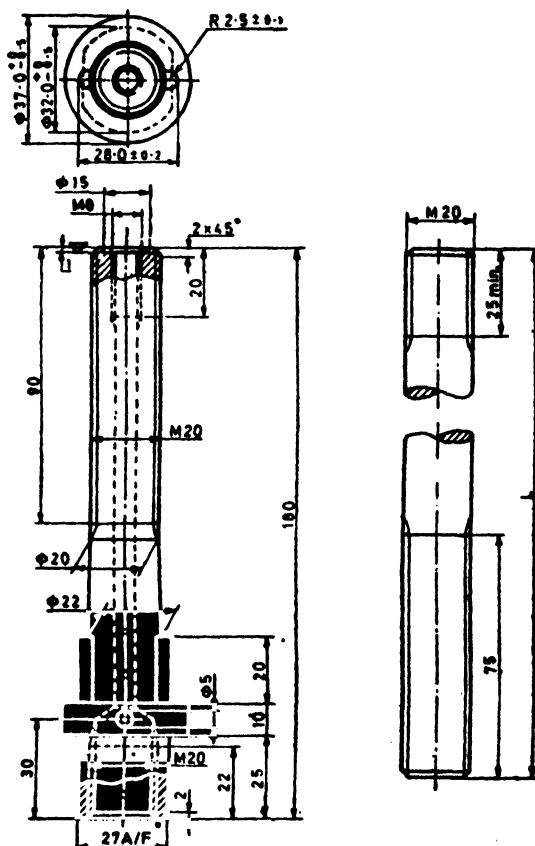
All dimensions in millimetres.

FIG. 1 STEM (FOR 17.5 kV/250A RATING)

*Dimensions of ends of bolts and screws (*first revision*).

†Dimensions of screw thread run-outs and undercuts (*first revision*).

IS : 3347 (Part III/Sec 2) - 1962



Dimension L to be such that the overall value 403 in Fig. 30 is obtained.

NOTE 1 — The corresponding porcelain part for these stems shall be 17.5 kV/630 A in Part III/Sec 1 of this standard.

NOTE 2 — Internal connections to the stem may also be made by means of flexible cable instead of using bolt. In such a case in place of threaded hole of M 20, a suitable hole required for the flexible cable may be made.

NOTE 3 — Head and bolt may be made in one piece.

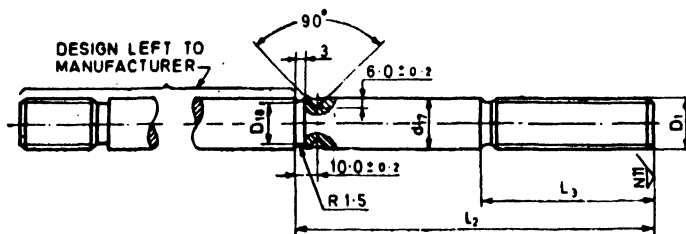
NOTE 4 — The threaded ends shall be chamfered in accordance with IS : 1368-1967*. The thread runouts and undercuts shall be in accordance with IS : 1369-1975†.

All dimensions in millimetres.

FIG. 2 STEM (FOR 17.5 kV/630A RATING)

*Dimensions of ends of bolts and screws (first revision).

†Dimensions for screw thread runouts and undercuts (first revision).



TYPE OF STEM	BUSHING RATING (kV/A)	CORRESPONDING RATING OF PORCELAIN PART OF SECTION I (kV/A)	D_1	D_{17}	D_{18}	L_2	L_3
Aluminium	17.5/630	17.5/1 000	M30 × 2	30	27	20	98
Copper	17.5/1 000	17.5/1 000	M30 × 2	30	27	206	98
Aluminium	17.5/1 000	17.5/2 000, 3 150	M42 × 3	42	39	236	128
Copper	17.5/2 000	17.5/2 000, 3 150	M42 × 3	42	39	236	128
Aluminium	17.5/2 000	17.5/2 000, 3 150	M48 × 3	48	45	241	133
Copper	17.5/3 150	17.5/2 000, 3 150	M48 × 3	48	45	241	133

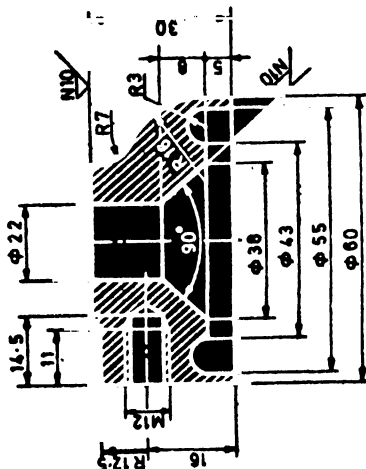
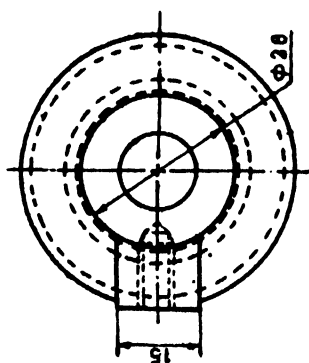
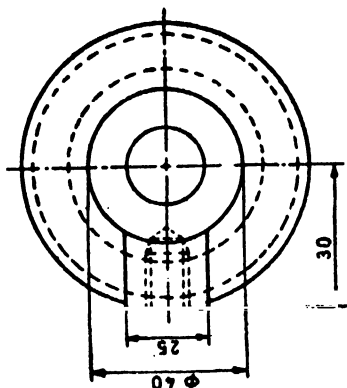
The threaded ends shall be chamfered in accordance with IS : 1368-1967*. The thread runouts and undercuts shall be in accordance with IS : 1369-1975†.

All dimensions in millimetres.

FIG. 3 STEM (FOR 17.5 kV/630, 1 000, 2 000 AND 3 150A RATING)

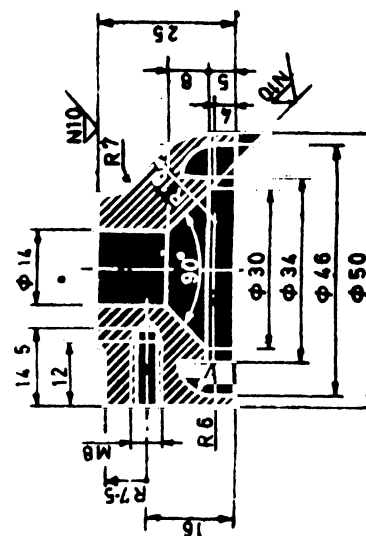
*Dimensions of ends of bolts and screws (*first revision*).

†Dimensions of screw thread runouts and undercuts (*first revision*).



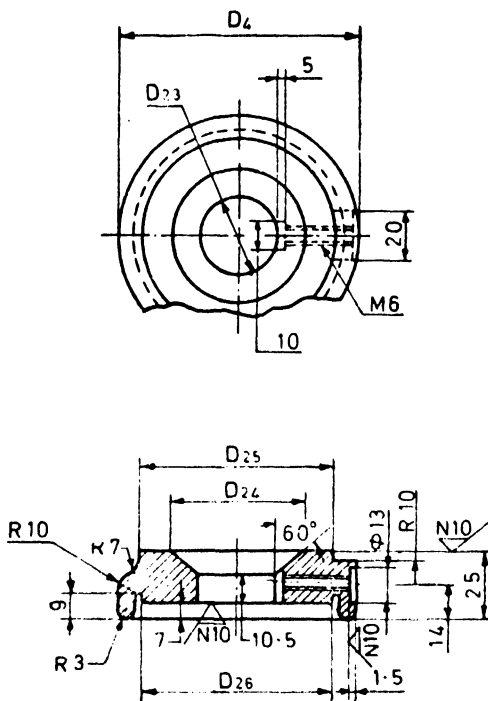
All dimensions in millimetres.

FIG. 5 CAP (FOR 24 kV/630 A RATING)



All dimensions in millimetres.

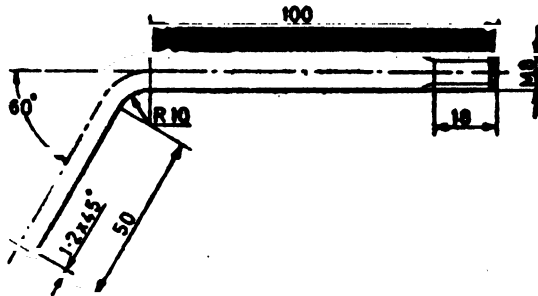
FIG. 4 CAP (FOR 24 kV/250 A RATING)



TYPE OF STEM	BUSHING RATING kV/A	D_4	D_{23}	D_{24}	D_{25}	D_{26}
Aluminium Copper	17.5/630 17.5/1 000	100	32	54	80	80
Aluminium Copper	17.5/1 000 17.5/2 000	120	44	66	100	100
Aluminium Copper	17.5/2 000 17.5/3 150	120	50	72	100	100

All dimensions in millimetres.

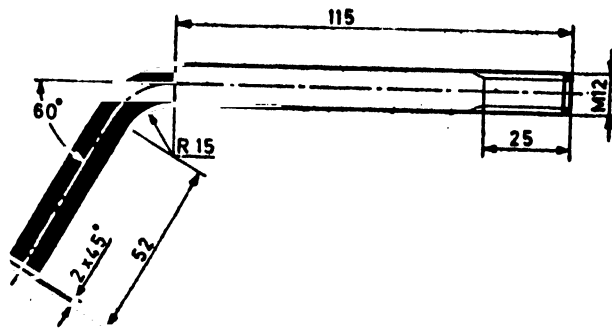
FIG. 6 CAP (FOR 17.5 kV/630, 1 000, 2 000 AND 3 150A RATING)



NOTE — The threaded ends shall be chamfered in accordance with IS : 1368-1967*. The thread runouts shall be in accordance with IS : 1369-1975†.

All dimensions in millimetres.

FIG. 7 UPPER SPARK-GAP HORN (FOR 17.5 kV/250A RATING)



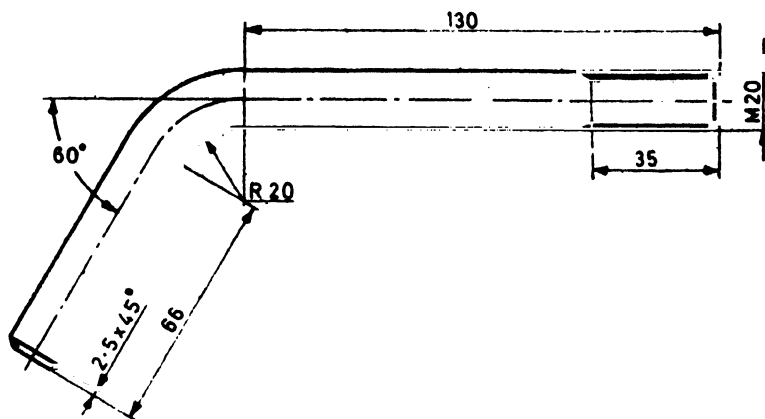
NOTE — The threaded ends shall be chamfered in accordance with IS : 1368-1967*. The thread runouts shall be in accordance with IS : 1369-1975†.

All dimensions in millimetres.

FIG. 8 UPPER SPARK-GAP HORN (FOR 17.5 kV/630A RATING)

*Dimensions of ends of bolts and screws (first revision).

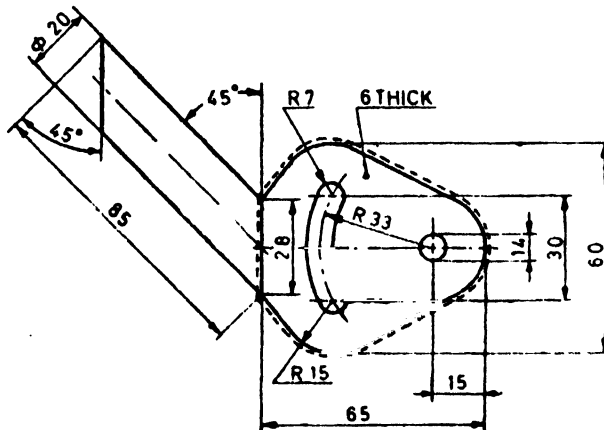
†Dimensions of screw thread run-outs and undercuts (first revision).



NOTE — Threaded ends shall be chamfered in accordance with IS : 1368-1967*. The thread runouts shall be in accordance with IS : 1369-1975†.

All dimensions in millimetres.

FIG. 9 UPPER SPARK-GAP HORN
(FOR 17.5 kV/630, 1 000, 2 000 AND 3 150A RATING)



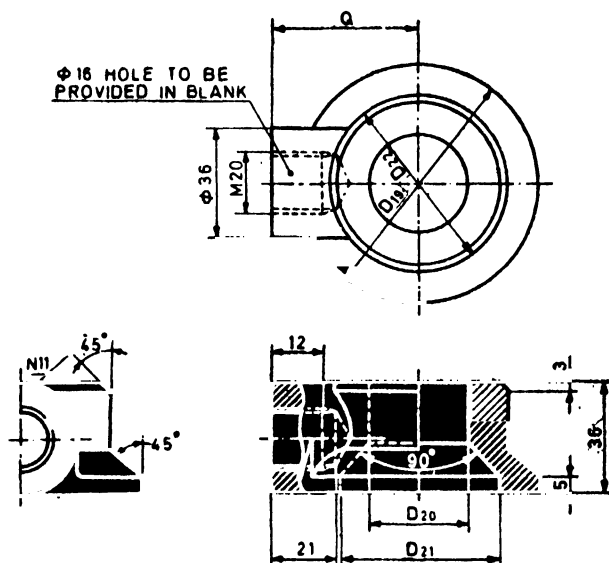
All dimensions in millimetres.

FIG. 10 LOWER SPARK-GAP HORN
(FOR 17.5 kV/630, 1 000, 2 000 AND 3 150A RATING)

*Dimensions of ends of bolts and screws (first revision).

†Dimensions of screw thread runouts and undercuts (first revision).

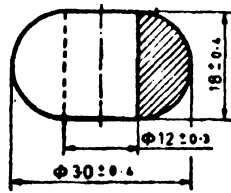
IS : 3347 (Part III Sec 2) - 1982



BUSHING RATING kV/A	FOR BUSHING WITH ALUMINIUM STEM					FOR BUSHING WITH COPPER STEM				
	D ₁₉	D ₂₀	D ₂₁	D ₂₂	Q	D ₁₉	D ₂₀	D ₂₁	D ₂₂	Q
17·5/630	80	32	54	60	50	—	—	—	—	—
17·5/1 000	100	44	66	80	55	80	32	54	60	50
17·5/2 000	100	50	72	90	60	100	44	66	80	55
17·5/3 150	—	—	—	—	—	100	50	72	90	60

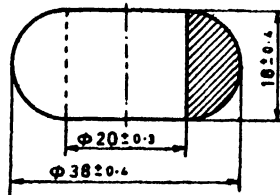
All dimensions in millimetres.

FIG. 11 SPARK-GAP HORN CARRIER
(FOR 17·5 kV/630, 1 000, 2 000 AND 3 150A RATING)



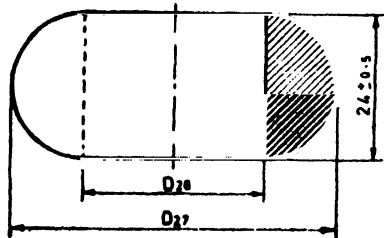
All dimensions in millimetres.

FIG. 12 SEALING WASHER FOR STEM (FOR 17.5 kV/250A RATING)



All dimensions in millimetres.

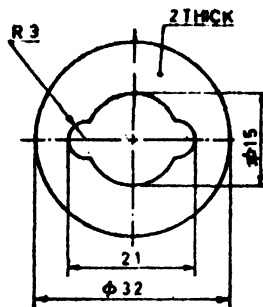
FIG. 13 SEALING WASHER FOR STEM (FOR 17.5 kV/630A RATING)



BUSHING RATING	FOR BUSHING WITH ALUMINIUM STEM		FOR BUSHING WITH COPPER STEM	
	$D_{27} \pm 0.5$	$D_{28} \pm 0.3$	$D_{27} \pm 0.5$	$D_{28} \pm 0.3$
17.5/630	54	30	—	—
17.5/1'000	66	42	54	30
17.5/2 000	72	48	66	42
17.5/3 150	—	—	72	48

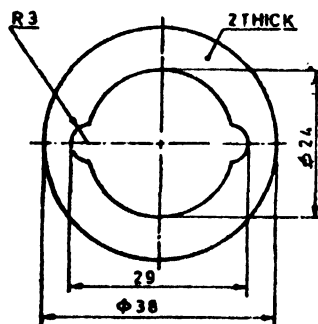
All dimensions in millimetres.

FIG. 14 SEALING WASHER FOR STEM
(FOR 17.5 kV/630, 1 000, 2 000 AND 3 150 A RATING)



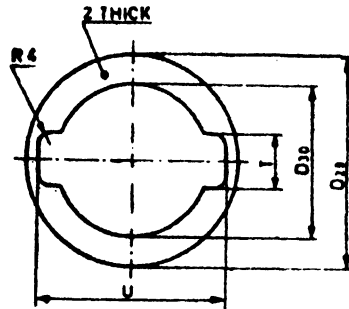
All dimensions in millimetres.

FIG. 15 SEPARATOR (FOR 17.5 kV/250 A RATING)



All dimensions in millimetres.

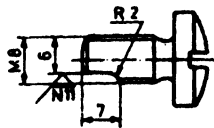
FIG. 16 SEPARATOR (FOR 17.5 kV/630 A RATING)



BUSHING RATING kV/A	BUSHING WITH ALUMINIUM STEM				BUSHING WITH COPPER STEM			
	D_{10}	D_{11}	T	U	D_{10}	D_{11}	T	U
17.5/630	56	32	12	48	—	—	—	—
17.5/1 000	70	50	17	62	56	32	12	48
17.5/2 000	70	50	17	62	70	50	17	62
17.5/3 150	—	—	—	—	70	50	17	62

All dimensions in millimetres.

FIG. 17 SEPARATOR (FOR 17.5 kV/630, 1 000, 2 000
AND 3 150A RATING)



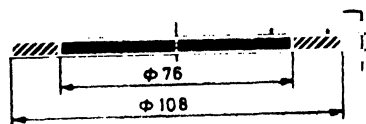
All dimensions in millimetres.

FIG. 18 VENT PLUG (FOR 17.5 kV/630A RATING)



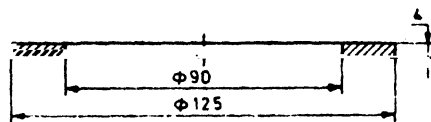
All dimensions in millimetres.

FIG. 19 VENT PLUG (FOR 17.5 kV/630, 1 000, 2 000
AND 3 150 A RATING)



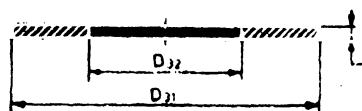
All dimensions in millimetres.

FIG. 20 SEALING WASHERS FOR GENERAL PURPOSE
(FOR 17.5 kV/250A RATING)



All dimensions in millimetres.

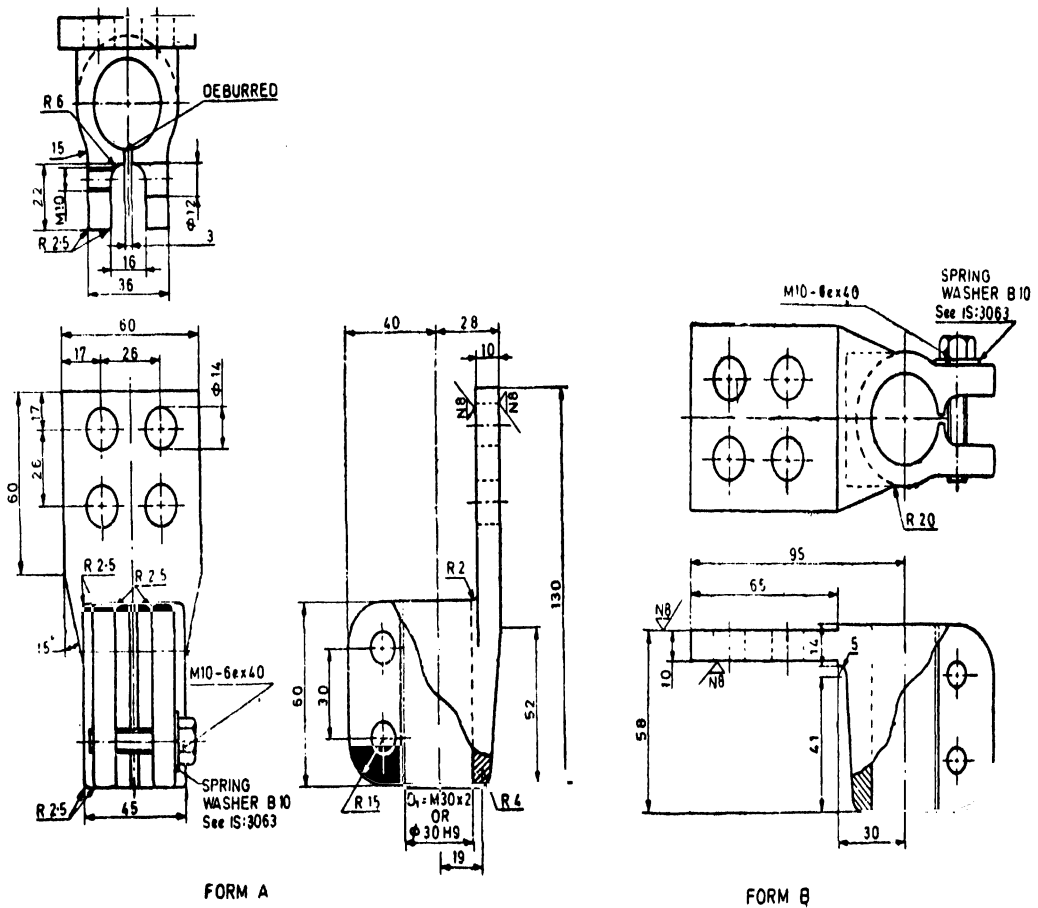
FIG. 21 SEALING WASHER FOR GENERAL PURPOSE
(FOR 17.5 kV/630A RATING)



BUSHING RATING kV/A	TYPE	BUSHING WITH ALUMINIUM STEM			BUSHING WITH COPPER STEM		
		D_{31}	D_{32}	S	D_{31}	D_{32}	S
17.5/630	M	80	36	2	—	—	—
	N	160	110	4	—	—	—
17.5/1 000	M	100	50	2	80	36	2
	N	180	135	4	160	110	4
17.5/2 000	M	100	50	2	100	50	2
	N	180	135	4	180	135	4
17.5/3 150	M	—	—	—	100	50	2
	N	—	—	—	180	135	4

All dimensions in millimetres.

FIG. 22 SEALING WASHER FOR GENERAL PURPOSE
(FOR 17.5 kV/630, 1 000, 2 000 AND 3 150 A RATING)



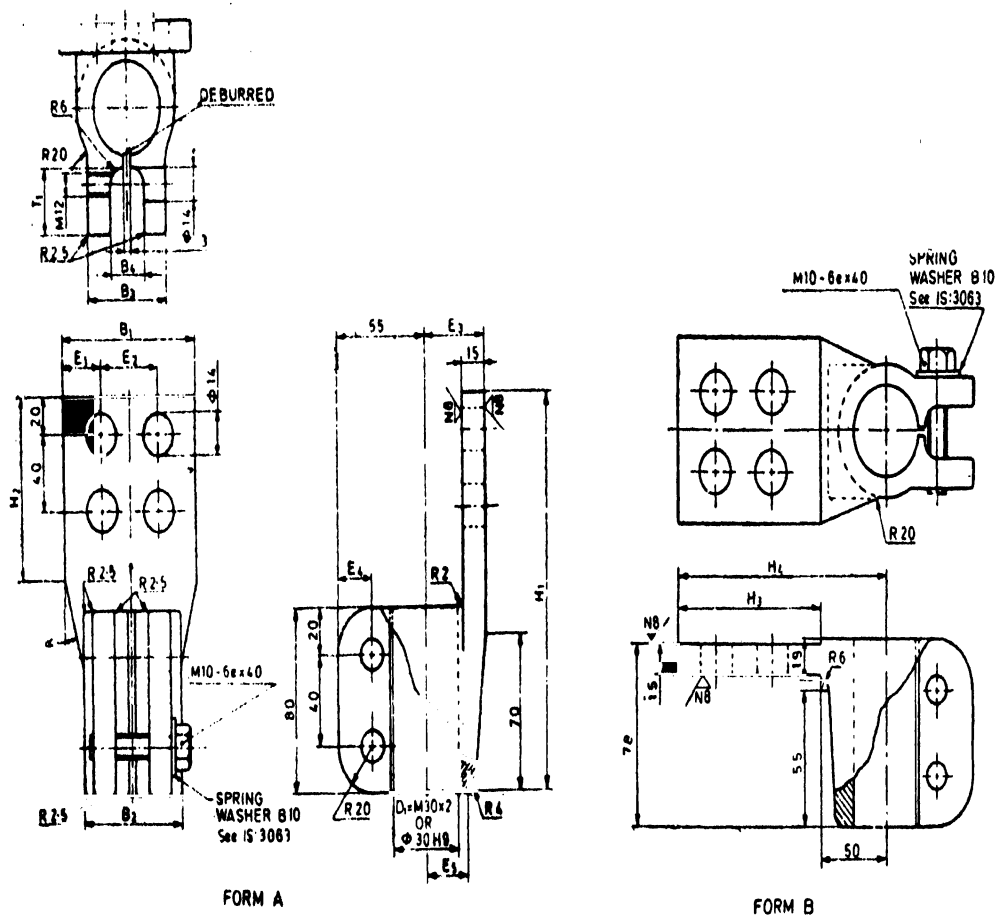
TYPE OF STEM	BUSHING RATINGS kV/A		
Aluminium	17.5/630	} Hexagonal Screw M10×40 IS : 1364-1967*	Spring Washer B10 IS : 3063-1972†
Copper	17.5/1 000		

All dimensions in millimetres.

FIG. 23A CONNECTING LUG (FOR 17.5 kV/630, 1 000A RATING)

*Specification for precision and semi-precision hexagon bolts, screws, nuts and lock nuts (diameter range 6 to 39 mm) (first revision).

†Specification for single coil rectangular section spring washers for bolts, nuts and screws (first revision).



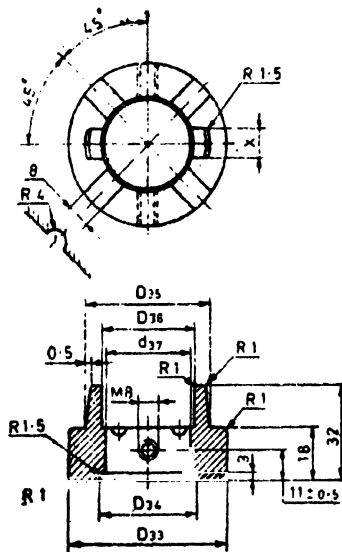
TYPE OF STEM	BUSHING RATINGS (kV/A)				D_1	B_1	B_2	B_3	B_4	E_1	E_2	E_3	E_4	E_5	H_1	H_2	H_3	H_4	T	α
Aluminium	24/1 000	Hexagonal Screw M12×50 IS : 1364-1967* IS : 3063-1972†	Spring washer B12	M42×3	100	58	45	20	25	50	40	20	25	190	100	105	155	28	26*	
Copper	24/2 000				120	68	58	28	30	60	45	18	30	210	120	125	175	26	30*	
Aluminium	24/2 000	Hexagonal Screw M12×65 IS : 1364-1967* IS : 3063-1972†	Spring Washer B12	M48×3	120	68	58	28	30	60	45	18	30	210	120	125	175	26	30*	
Copper	24/3 150				120	68	58	28	30	60	45	18	30	210	120	125	175	26	30*	

All dimensions in millimetres.

FIG. 23B CONNECTING LUG (FOR 17.5 kV/1 000, 2 000 AND 3 150 A RATING)

*Specification for precision and semi-precision hexagon bolts, screws, nuts and lock nuts (diameter range 6 to 39 mm)
(first revision).

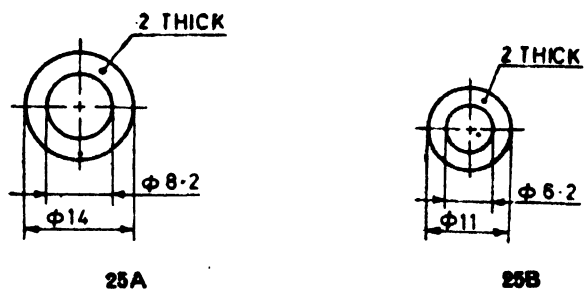
†Specification for single coil rectangular section spring washers for bolts, nuts and screw (first revision).



TYPE OF STEM	BUSHING RATING	D_{33}	D_{34}	D_{35}	D_{36}	D_{37}	X
Aluminium Copper	17.5/630 17.5/1 000	56	34	44	33	30.7	10
Aluminium Copper	17.5/1 000 17.5/2 000	70	46	60	50	42.7	15
Aluminium Copper	17.5/2 000 17.5/3 150	70	52	60	50	48.7	15

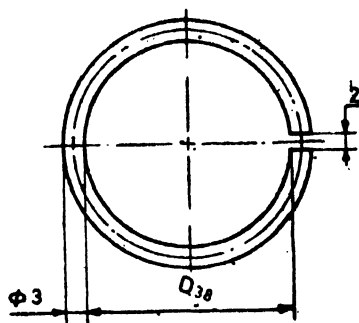
All dimensions in millimetres.

FIG. 24 COLLAR (FOR 17.5 kV/630, 1 000, 2 000 AND 3 150A RATING)



All dimensions in millimetres.

FIG. 25 GASKET RING (FOR 17.5 kV/630, 1 000, 2 000 AND 3 150A RATING)

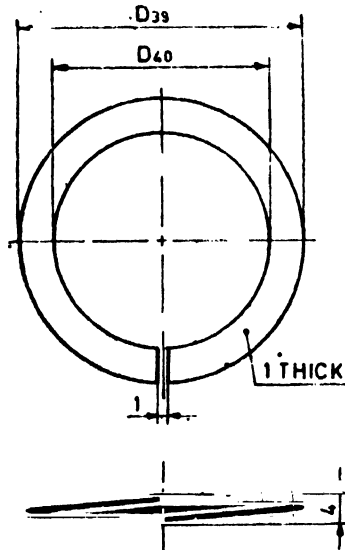


BUSHING RATING kV/A	BUSHING WITH ALUMINIUM STEM		BUSHING WITH COPPER STEM	
	D_{38}	Stretched Length	D_{38}	Stretched Length
17.5/630	27	92.4	—	—
17.5/1 000	39	130	27	92.4
17.5/2 000	45	152	39	130
17.5/3 150	—	—	45	152

All dimensions in millimetres.

FIG. 26 RETAINING RING (FOR 17.5 kV/630, 1 000, 2 000 AND 3 150A RATING)

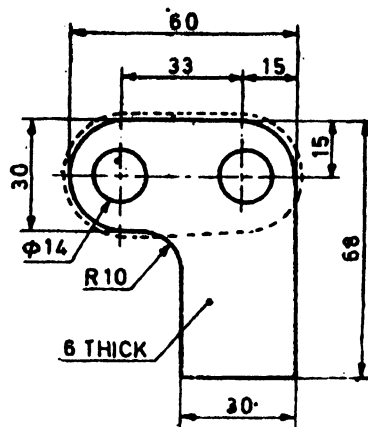
IS : 3347 (Part III/Sec 2) - 1982



BUSHING RATING kV/A	BUSHING WITH ALUMINIUM STEM		BUSHING WITH COPPER STEM	
	D_{39}	D_{40}	D_{39}	D_{40}
17·5/630	76	58	—	—
17·5/1 000	96	70	76	58
17·5/2 000	96	76	96	70
17·5/3 150	—	—	96	76

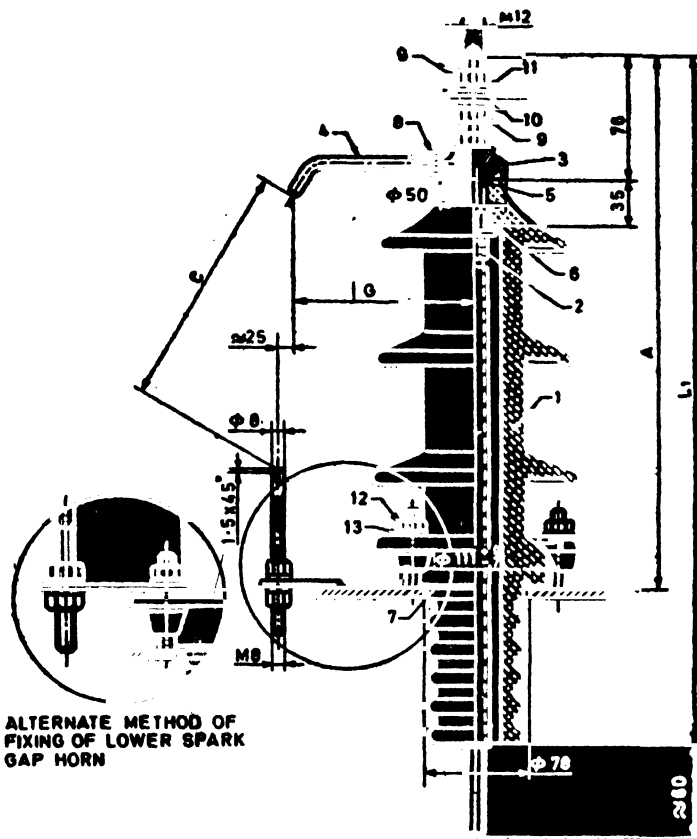
All dimensions in millimetres.

**FIG. 27 U-LINK RING (FOR 17·5 kV/630, 1 000, 2 000 AND
3 150A RATING)**



All dimensions in millimetres.

FIG. 28 T-BRACKET (FOR 17.5 kV/630, 1 000, 2 000 AND
3 150 A RATING)



BUSHING RATING	<i>A</i>	<i>C</i>	<i>G</i>	<i>L₁</i>
kV/A				
17.5/250	310	85	150	371

PARTS NOMENCLATURE

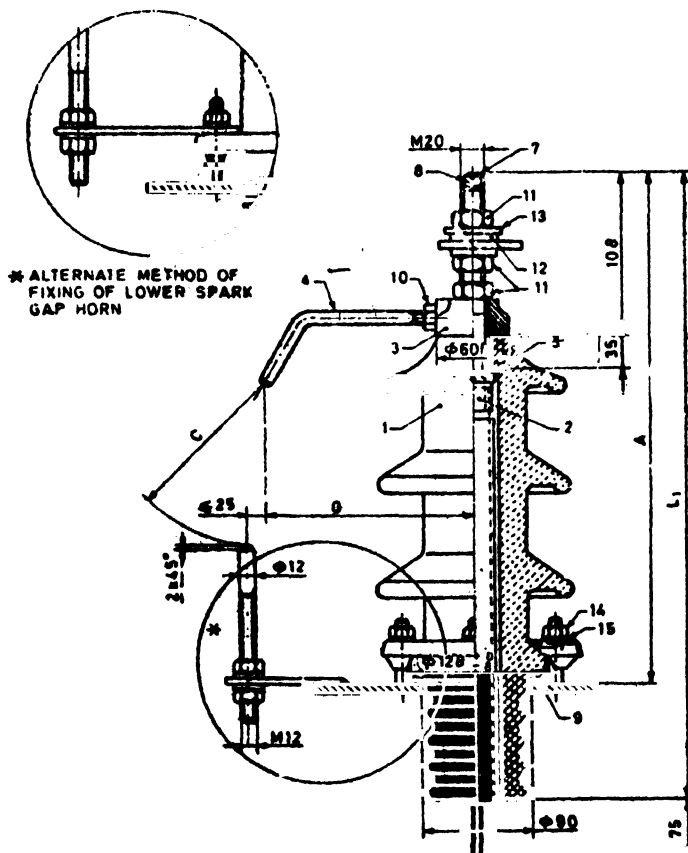
- | | | |
|----------------------------|--|------------------------|
| 1. Insulator | 6. Separator | 10. Plain washer AM 12 |
| 2. Stem | 7. Sealing washer for
general purpose | 11. Spring washer B 12 |
| 3. Cap | 8. Hexagonal nut M 8 | 12. Hexagonal nut M 10 |
| 4. Upper spark gap horn | 9. Hexagonal for stem nut | 13. Plain washer AM 10 |
| 5. Sealing washer for stem | | |

NOTE 1—Clamping arrangement of bushings shall be according to IS : 4257 (Part I)-1981*.

NOTE 2 — Alternate arrangement for fixing of lower spark gap horn may be used.
All dimensions in millimetres.

FIG. 29 BUSHING ASSEMBLY (FOR 17.5 kV/250 A RATING)

*Dimension for clamping arrangements for porcelain transformer bushings: Part I
For 12 kV to 36 kV bushings (first revision).



BUSHING RATING
kV/A
17.5/630

A	C	G	L ₁
342	85	190	403

PARTS NOMENCLATURE

- | | | |
|----------------------------|---------------------------------------|------------------------------|
| 1. Insulator | 6. Separator | 10. Hexagonal nut M 12 |
| 2. Stem | 7. Vent plug | 11. Hexagonal nut (for stem) |
| 3. Cap | 8. Gasket ring | 12. Washer |
| 4. Upper spark gap horn | 9. Scaling washer for general purpose | 13. Spring washer B 20 |
| 5. Sealing washer for stem | | 14. Hexagonal nut M 10 |
| | | 15. Washer M 10 |

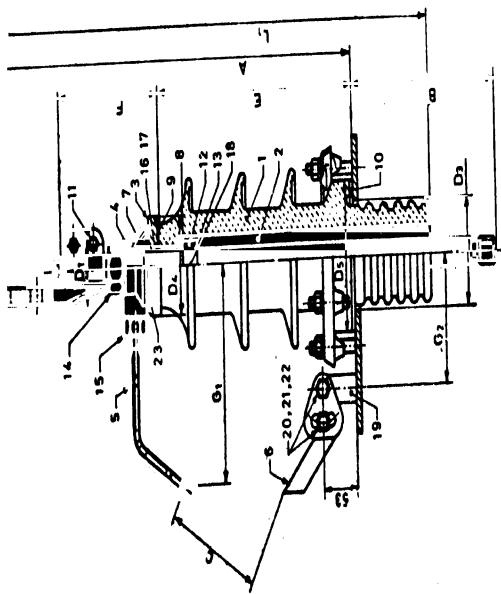
NOTE 1 — Clamping arrangement of bushing shall be according to IS : 4257 (Part I) - 1981*.

NOTE 2 — Alternate arrangement for fixing of lower spark gap horn may be used.

All dimensions in millimetres.

FIG. 30 BUSHING ASSEMBLY (FOR 17.5 kV/630 A RATING WITH COPPER STEM)

*Dimensions for clamping arrangement for porcelain transformer bushings: Part I For 12 kV to 36 kV bushings (first revision).



Bushing Rating (kV/A.)	Bushing Rating (kV/A.)		A	B	C	D ₁	D ₂	D ₃	D ₄	D ₅	E	F	G ₁	G ₂	L ₁
	With Aluminum Stem	With Copper Stem													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	
17-5/630		17-5/1 000	455	158	85	M 30 × 2	110	100	163 ± ₁₆	239	148	225	138	541	
17-5/1 000		17-5/2 000	530	158	85	M 42 × 3	135	120	183 ± ₁₈	239	178	230	148	616	
17-5/1 500		17-5/2 000	560	158	85	M 48 × 3	135	120	183 ± ₁₈	239	183	235	148	646	

PARTS NOMENCLATURE

- | | | |
|--------------------------|--|------------------------|
| 1. Insulator | 10. Sealing washer for general purpose | 19. T-bracket |
| 2. Stem | Type N | 20. Bolt M 12 × 30 |
| 3. Cap | 11. Connecting lug | 21. Nut M 12 |
| 4. Snap-cap horn carrier | 12. Collar | 22. Spring washer B 12 |
| | | 23. U link ring |

17. Gasket ring
18. Grub screw $M 8 \times 15$
19. Gasket shall be according to IS : 4257 (Part I)-1981*.

NOTE 1 — Clamping arrangements of bushing shall be according to 13.4.15.

All dimensions in millimetres.

FIG. 31 BUSHING ASSEMBLY (FOR 17.5 kV/630, 1 000, 2 000 AND 3 150A RATING)

FIG. 31. Dimensions for clamping arrangement for porcelain transformer bushings : Part I For 12 kV to 36 kV bushings (first revision).

**AMENDMENT NO. 2 APRIL 1994
TO
IS 3347 (Part 3/Sec2) : 1982 DIMENSIONS FOR
PORCELAIN TRANSFORMER BUSHINGS FOR USE IN
LIGHTLY POLLUTED ATMOSPHERES:**

PART 3 17.5 kV BUSHINGS,

Section 2 Metal Parts

(First Revision)

(Page 11, Fig. 1) — Substitute 'R 2.5 ± 0.1' for 'R 3.5 ± 0.1' for dimensions of locking pins.

(ETD 06)

Printed at Simco Printing Press, Delhi, India

**AMENDMENT NO. 1 FEBRUARY 1989
TO
IS : 3347 (Part 3/Sec 2) 1982 DIMENSIONS FOR
PORCELAIN TRANSFORMER BUSHINGS FOR USE
IN NORMAL AND LIGHTLY POLLUTED
ATMOSPHERES**

PART 3 12 AND 17.5 kV BUSHINGS

Section 2 Metal Parts

(First Revision)

(First cover, pages 1 and 3, title) — Substitute the following for the existing title:

‘Indian Standard

**DIMENSIONS FOR PORCELAIN TRANSFORMER
BUSHINGS FOR USE IN LIGHTLY POLLUTED
ATMOSPHERES**

PART 3 17.5 kV BUSHINGS

Section 2 Metal Parts

(First Revision)’

(Page 5, clause 1.1, third line) — Delete the words ‘normal and’.

(ETDC 3)

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